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1. General

The Optris Ethernet TCP/IP /Modbus TCP interface box can be easily combined with any Optris Xi imager (except Xi 400) or Optris CSvision pyrometer. The interface has a 4-pin, M12, D-coded connector. It is suited for industrial Ethernet with an IP67 protection rate. It is suited for industrial communication with an IP67 protection rate and a screw retention feature.

The network settings are stored on the board and the board communicates with the Optris devices via serial interface. The network settings remain on the board in case of interchanging the Optris devices.

1.1 Device settings

Use the supplied USB cable for the device to set the device for the Ethernet TCP/IP / Modbus TCP communication.

For Optris CSvision use the software *CompactPlus Connect* and go to **SETUP** Menu. Go to Tab **Advanced Settings** and choose the **RS422** Mode under Interface and choose **115200** Baud rate.

For Optris Xi-series use the software PIXconnect and set the camera to the Digital PIF mode and 115.2 kBaud rate and "0" as Bus address (unhook the control box under Bus address). You have the possibility to choose up to 9 measuring areas (9 ROI for Xi 80, 3 ROI for Xi 410). At least you must configure one ROI as autonomous area.

2. Scope

The Optris Ethernet TCP/IP / Modbus TCP communication Interface allows you to communicate with your device via the TCP/IP or Modbus TCP protocol in a network.



For the communication different possibilities are supplied:

- Software CompactPlus Connect (for CSvision)
- Excel sheet with macros for the TCP/IP communication
- Communication with your Modbus tool via the Modbus TCP protocol
- Fully developed C# scripts as pre-installed

Figure 1: Optris Ethernet TCP/IP / Modbus TCP communication interface board

3. Installation overview

3.1 Hardware Installation

Connect the interface box cable of your Optris device to the ACXICSVENMBTCPK like described in ACXICSVENMBTCPK-MAD. Power the interface box with 5-30 VDC. Connect the Ethernet TCP/IP / Modbus TCP communication interface board socket with a network cable to a switch in your network (**DHCP mode**) – recommended, or directly to your PC (**direct mode**) – delivery status. You can change the network mode manually as described in chapter 5.

The baud rate must be set to 115k baud and "0" as Bus address for the communication on the Optris device. Connect your Optris device with the supplied USB cable and change the settings in the Optris software CompactPlus Connect for CSvision or PIX Connect for Xi series.

3.2 IP-address mode

The Network interface is supplied in static mode by default, the static IP address is **192.168.0.103**. To change the mode to the DHCP mode are different possibilities available:

1. Supplied Excel sheet (**3.3**)
2. Web browser of the network adapter (**3.4**)
3. Manually, as described in chapter 5

Note: In the DHCP mode you have to connect the interface to your company network to get the IP address of the interface. To find the IP address use the supplied Excel sheet (**3.3**), or the software CompactPlus Connect (for CSvision, **3.5**) or your own DHCP commissioning tool.

3.3 Supplied Excel sheet

Open the supplied Excel sheet. Under the tab **Discover** click on the button **Discover devices**. All connected Xi/CSV Ethernet TCP/IP modules in your network will be shown in the table.

TCP/IP devices :							
IP address	MAC address	Ipmode	static IP	subnet mask	Port config	Port command	Port Modbus
192.168.49.77	00:1A:B6:00:02:74	0	10.10.10.1	255.255.255.0	55001	55002	502

Use the found IP address to change the IP mode under the tab **Configuration**.

Under the tab **Read_Temp** use the drop-down menu button to select founded IP addresses of the Ethernet TCP/IP modules and click on the button **Connect**, the table will be filled, and the diagram will show the measured temperature values. The table is limited to the set number of values.

3.4 Web browser

Open your web browser and type the IP-address in the address line in the web browser:

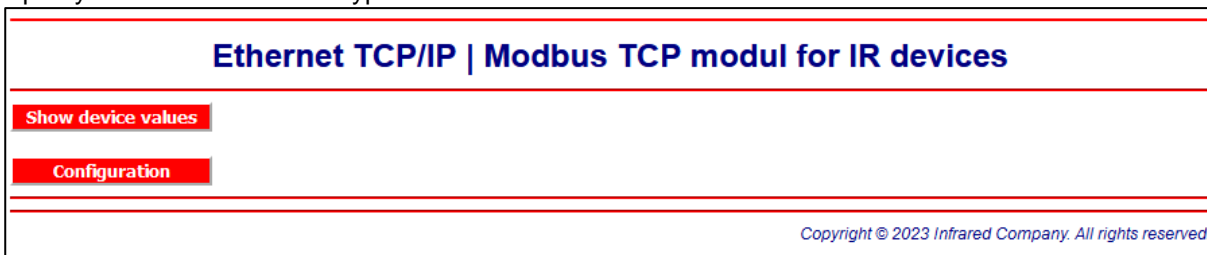


Figure 2: Web interface of the Ethernet TCP/IP Modbus TCP module

Click on **Configuration**. Change the IP address mode and click on **Update Settings**.

Ethernet TCP/IP | Modbus TCP modul for IR devices

Show device values

Network configuration

(MAC address : 9C:43:1E:7F:FF:FF | Serial : -1 | Firmware : 3001)

Control	Value
IP address mode :	<input type="text" value="DHCP"/>
Static IP address :	<input type="text" value="192.168.0.1"/>
Netmask :	<input type="text" value="255.255.255.0"/>
Command port :	<input type="text" value="80"/>
Configuration port :	<input type="text" value="55001"/>
Modbus TCP port :	<input type="text" value="502"/>

Figure 3: Network Configurations of the Ethernet TCP/IP Modbus TCP module

3.5 CompactPlus Connect

Start the software *CompactPlus Connect* and go to **Device** and **Scan Devices**. All devices are shown in a list. Click on wished device and click on **Select**.

Device Selection ✕

No.	Device	Baudrate	Serial	Com	TProc
0	OPTCSVIR2...	921600	23020016	COM13	300
1	OPTCT4ML	921600	21090001	COM7	24,9
2	OPTCTR2ML	115.2 K	21092007	192.168.0.4:...	275

Note: the earliest version of *CompactPlus Connect* which supports the TCP/IP communication is **1.6.27**

3.6 C#-Examples

A folder with pre-installed files written in C# you can find on the USB flash drive as an example. There are three windows batch files to demonstrate the possibilities of integration into your own software. To communicate with the TCP/IP interface, change in the batch files the IP address to the IP address of the interface and execute the batch files. *Discovery.bat* and *GetConfig.bat* are files to see your configurations and ports. For the temperatures, execute the *command.bat* file.

4. LED functions

- The Ethernet TCP/IP / Modbus TCP module has 4 LED (I1...I4).
- I1 – LED on → The connection to the Optris device is established
 - I2 – LED → no function
 - I3 – LED on → Ethernet connection is established
 - I3 – LED is flashing → data transfer
 - I4 – LED → reset function

5. Reset Button – change IP mode

5.1 How to set the interface to DHCP mode

The interface must be switched off. Press the button **SW** on the board and switch the box on in the meantime. The I4 – LED flashes red. Release the button the **fifth** time it flashes. I4 – LED flashes green 5 times as confirmation. After reset follow settings are restored:

IP-Mode:	DHCP
Static IP:	0.0.0.0
Subnet mask:	0.0.0.0
Port Modbus:	502
Port Config data:	55001
Port direct device:	55002

5.2 How to set the interface to direct mode

The interface must be switched off. Press the button **SW** on the board and switch the box on in the meantime. The I4 – LED flashes red. Release the button the **sixth** time it flashes. I4 – LED flashes green 6 times as confirmation. After reset follow settings are restored:

IP-Mode:	static
Static IP:	192.168.0.103
Subnet mask:	255.255.255.0
Port Modbus:	502
Port Config data:	55001
Port direct device:	55002

6. Connection of multiple devices

Each of the devices must get an own IP address but they must be in the same subnet.

7. Troubleshooting

In case of missing .NET packages please go to the website <https://dotnet.microsoft.com/en-us/download/dotnet/thank-you/runtime-6.0.25-windows-x64-installer> and download the package for your operating system.

For the communication with the supplied Excel sheet the macros must be activated and accepted.

In case of a possibility to communicate directly via the IP address but the CompactPlus Connect software cannot find the TCP/IP module in the network

1. Check the subnet mask, the subnet of your Network and of the interface must be the same
2. Check your firewall settings, the firewall has to be permitted for the Communication for the software

Set the module to its default settings if required. Like described in chapter 5.

Make sure that you have the right firmware. The LED I4 must flash once after powering the module.

8. Modbus Register list

For the communication with a PLC, you can use a Modbus tool. The complete list you will find on the manufacturer's website.

Use a Modbus tool with following settings and your IP address.

Read out the data is done via the **Read Holding Register** and **Read Input Register**.

Changing the settings of the device is done over the **Write Holding Register**.

Connection type:	Tcp
Host address:	192.168.49.77
Port:	502
Byte order:	4321

03 Read Holding Registers
01 Read Coils
02 Read Discrete Inputs
03 Read Holding Registers
04 Read Input Registers
05 Write Single Coil
06 Write Single Register
08 Diagnostics
15 Write Multiple Coils
16 Write Holding Registers

8.1 Input Register

Description	Type	Register Address	Register-Size	Data-Format	Comment
Serial number	R - Input Register	1010	2	=ByteH(1)*2^24+ByteL(1)*2^16+ByteH(2)*8+ByteL(2)	
FW Revision	R - Input Register	1012	1	=(ByteH * 256 + Byte2)	

Description	Type	Register Address	Register-Size	Unit []	Data-Format	Comment
Temp. - process	R - Input Register	1020	1	°C	= (Value - 1000) / 10	
Temp. - Head	R - Input Register	1021	1	°C	= (Value - 1000) / 10	Temp.-Flag for Xi-series
Temp. - Box	R - Input Register	1022	1	°C	= (Value - 1000) / 10	
Temp. - Act	R - Input Register	1023	1	°C	= (Value - 1000) / 10	Temp.-Chip for Xi-series
Temp - Ratio	R - Input Register	1025	1	°C	=(ByteH * 256 + ByteL - 1000) / 10	Only for CSvision
Temp - T2	R - Input Register	1026	1	°C	=(ByteH * 256 + ByteL - 1000) / 10	Only for CSvision
Temp - T1	R - Input Register	1027	1	°C	=(ByteH * 256 + ByteL - 1000) / 10	Only for CSvision
Temp - Attenuation	R - Input Register	1028	1	°C	=(ByteH * 256 + ByteL - 1000) / 10	Only for CSvision

Description	Type	Register Address	Register-Size	Unit []	Data-Format	Comment
Epsilon T1	R - Input Register	1042	1		= (ByteH * 256 + ByteL) / 1000	Only for CSvision
Epsilon T2	R - Input Register	1043	1		= (ByteH * 256 + ByteL) / 1000	Only for CSvision
Slope	R - Input Register	1044	1		= (ByteH * 256 + ByteL) / 1000	Only for CSvision

Description	Type	Register Address	Register-Size	Unit []	Data-Format	Comment
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Area count	R - Input Register	1089	1	-	$= (\text{Value} - 1000) / 10$	Only for Xi-Series
Temp. Area 1-9	R - Input Register	1090-1098	1	°C	$= (\text{ByteH} * 256 + \text{ByteL} - 1000) / 10$	Only for Xi-Series
Temp. Calc.-Object 1-9	R - Input Register	1100-1108	1	°C	$= (\text{ByteH} * 256 + \text{ByteL} - 1000) / 10$	Only for Xi-Series

8.2 Holding Register

Description	Type	Register Address	Register-Size	Unit []	Data-Format	Comment
Epsilon	R/W - Holding Register	10010	1		$= (\text{ByteH} * 256 + \text{ByteL}) / 1000$	
Transmission	R/W - Holding Register	10011	1		$= (\text{ByteH} * 256 + \text{ByteL}) / 1000$	
Spot Illumination Laser	R/W - Holding Register	10012	1		1 = On 0 = Off	Only for CSvision
AVG Time	R/W - Holding Register	10013	1	ms	= Value	Only for CSvision
AVG Mode	R/W - Holding Register	10014	1		1 = Smart Averaging 0 = Normal	Only for CSvision
Smart Threshold	R/W - Holding Register	10015	1	ms	= Value	Only for CSvision
Hold time	R/W - Holding Register	10016	1	ms	= Value	Only for CSvision
Advanced Hold Mode	R/W - Holding Register	10017	1		0 = Off 1 = Peak 2 = Valley 3 = Adv. Peak 4 = Adv. Valley	Only for CSvision
Advanced Hold Threshold	R/W - Holding Register	10018	1		$= (\text{Value} - 1000) / 10$	
Advanced Hold Hysteresis	R/W - Holding Register	10019	1	°C	$= (\text{Value}) / 10$	
Temp. Unit	R/W - Holding Register	10053	1		0 = °C 1 = °F	
Focusmotor position	R/W - Holding Register	1056	1			
Filtermotor position	R/W - Holding Register	1057	1			Only for CSvision

9. Contact information

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